

Original communication

Characterization of the gunshot suicides

Y. Balci PhD (Professor) ^{a,*}, G. Canogullari MD (Forensic Specialist) ^a,
E. Ulupinar PhD (Associate Professor) ^b

^a Department of Forensic Medicine, Faculty of Medicine, Osmangazi University, 26480-Eskisehir, Turkey

^b Department of Anatomy, Faculty of Medicine, Osmangazi University, 26480-Eskisehir, Turkey

Received 9 August 2005; received in revised form 31 May 2006; accepted 14 June 2006

Available online 23 February 2007

Abstract

The aim of this study is to present the characteristics of gunshot suicides by highlighting the ones with multiple entrance wounds.

The criminal investigation reports of suicides ($n = 318$) during the period 1991–2000, in the central judicial district of Eskisehir were investigated. 20.4% of all suicide cases ($n = 65$) used firearms. Firearm suicides were more common in males and their frequency decreased as age increased. The usage of long-barrelled weapons was 47.7%. Among the long-barrelled gunshots, twelve were shotguns and the remaining were military rifles. Forty-five weapons were legal. Thirty-four out of 45 gunshot suicide victims had licensed weapons because of their occupations. In the majority of cases, (72.3%) the shooting distance was contact or near contact. Most of the entrance wounds (75.0%) were located in the head and neck region and the direction of the bullet path was upward and front-to-back. Of all the gunshot suicides, 6.1% ($n = 4$) had multiple entrance and exit wounds. All of the victims were soldiers. In suicide cases using long-barrelled weapons (3/4), military rifles were set on automatic mode.

In our study, at least eight of the victims survived for a period. To be able to increase the survival rate of the victims or improve the outcomes, intensive pre- and post-operative care is critical.

© 2006 Elsevier Ltd and FFLM. All rights reserved.

Keywords: Firearms; Suicide; Multiple entrance wounds; Gunshot injury

1. Introduction

Suicides are fairly common; they are one of the most significant causes of death in many countries around the world. Although it varies among different countries there are relatively more numbers of suicides caused by gunshots.^{1–9} In gunshot fatalities, to determine whether the cause of death originated by suicide the following information is particularly valuable: the shooting distance, firearm discharge residues on the hand, the number and localization of entrance wounds. In addition, the scene findings such as the presence of a suicide note at the scene of death, the presence of a pistol either in the hand or in the vicinity

of the victim^{10–13} are also an important piece of information to have.

In gunshot suicides, the weapon from the hand of the victim is generally found at the scene of death or sometimes directly in the hand of the victim due to the cadaveric spasm.¹² The shots are generally fired from contact or near-contact range, and the weapon is generally a pistol.^{1,13,14} Most of the suicides showed a single entrance wound. This was predominantly localised in the right temple region of the cranium in suicides with the short-barrelled weapons; whereas with the long-barrelled weapons^{1,5,10,11,13,15–19} the entrance is seen under the chin or chest region. However, suicides involving shooting at different regions of the body from a reaching distance of the arm have also been reported.^{5,13,20} Moreover, in some of the more extraordinary suicide cases, a limited reaching distance of the arm was overcome by the usage of special

* Corresponding author. Tel.: +90 222 239 2979/4483; fax: +90 222 229 0170.

E-mail address: ybalci@ogu.edu.tr (Y. Balci).

setup pulling the trigger.^{13,21} Furthermore there are less common suicide cases with more than one entrance wound.^{1,5,13,17,20,22,23} This study presents the characteristics of gunshot suicides and places by special emphasis on the cases with multiple entrance wounds.

2. Materials and methods

The first step involved analysing the computer records of criminal investigation reports of the suicides ($n = 318$), in the central judicial district of Eskisehir in Turkey, from the period of 1991–2000. In addition, the documentation found in the court folders of the victims (including scene investigation reports and drawings, autopsy reports, photographs, testimonies of the victim's relatives and other eyewitnesses etc.) was examined retrospectively. Demographic data and the method of suicide were transferred on to a basic data collection form. In the cases of gunshot suicides ($n = 65$), additional information was also included; occupation of the victim, type and license, condition of the weapon, whether another suicide method was tried before shooting, the number of entrance wounds and their localization, shooting distance, direction of the bullet path, duration between shooting and time of death.

As well as descriptive statistical analysis, a statistical software program used, χ^2 and Fisher's exact tests to evaluate the relations between variables and to compare them with those of the Turkish population. The significance value was set up at 0.05.

3. Results

In Eskisehir, 318 suicide cases occurred between 1991 and 2000. Overall, 69.2% of the victims were male ($n = 220$) and 30.8% of them were female ($n = 98$). The distribution of suicide cases relating to the method of suicide and gender is shown in Table 1. Among these suicide cases, firearm suicides were a significant proportion of the total (20.4%). Firearm suicides were more common in males with a percentage of 91.8% (59/65) than females (9.2%, 6/65). Therefore, the usage of gunshot as a method of suicide was significantly higher in males than females ($p < 0.001$).

Table 2 shows the age distribution of suicide cases with regard to suicide methods. The mean age of the victims is 36.9 ± 17.8 in all suicide cases, and it is significantly different between gunshot suicides (29.2 ± 12.8) and other suicides (39.7 ± 18.6 , $p < 0.001$). The gunshot usage rate with regard to the under-20 age group is 25.5% (13/51) and the 21–54 age group is 23.1% (46/198) respectively; whereas it is 8.7% (6/69) in the third group (older than 55 years). Therefore, the percentage of gunshot suicides decreased as age increased ($p < 0.05$).

Of the gunshot suicides, 69.2% were used authorized weapons ($n = 45$). The occupation of victims with respect to obtaining the weapon according to authorization condition is shown in Table 3. Thirty-four out of 45 gunshot suicide victims had licensed weapons because of their

Table 1
The method of suicides with regard to gender (1991–2000)

Method	Male		Female		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Hanging	112	50.9	63	64.3	175	55.0
Gunshot wounding	59	26.8	6	6.1	65	20.4
Intoxication	12	5.5	16	16.3	28	8.8
Jumping from high	18	8.2	8	8.2	26	8.2
Others ^a	19	8.6	5	5.1	24	7.6
Total	220	100.0	98	100.0	318	100.0

χ^2 : 26.63, $p < 0.001$.

^a Burning one's self, by being choked under water, jumping while train was coming, breathing butane gas.

Table 2
Age distribution of victims with regard to suicide methods

Age group	Gunshot suicides		Other suicides		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
≤ 20	13	20.0	38	15.0	51	16.0
21–54	46	70.8	152	60.1	198	62.3
≥ 55	6	9.2	63	24.9	69	21.7
Total	65	100.0	253	100.0	318	100.0

χ^2 : 7.60, $p < 0.05$.

Table 3
Occupation of the suicide cases with regard to authorization of the weapon

Occupation	Authorized	Unauthorized
Soldiers (people on military service)	20	–
Military personnel	8	–
Police or retired police	5	–
Self-employed	4	12
Unemployed	3	5
State employee	2	1
Security Personnel	1	–
Driver (as a profession)	1	2
Student	1	–
Total	45	20

occupations. Four of them used someone else's licensed weapon and one of them used a weapon belonging to her father, who was a military personnel. The majority of the victims using unauthorized weapons were self-employed persons.

In gunshot suicides, 47.7% of the weapons were long-barrelled ($n = 31$) and 52.3% of them were short-barrelled ($n = 34$). Half of short-barrelled weapons were unauthorized ($n = 17$), the majority of the long-barrelled group were authorized ($n = 28$). All of the short-barrelled gunshots were handguns, with 7.65 and 9 mm calibres. Among the long-barrelled gunshots, 12 of them were shotguns, and the remainder was automatic or semi-automatic military rifles with 7.62 mm calibres.

The shooting distance with regard to the type of weapon is given in Table 4. While in 72.3% of the suicides, shooting

Table 4
Shooting distance with regard to type of the weapon

Shooting distance	Short-barrelled	Long-barrelled	Total
Contact/near contact	25	22	47
Intermediate	9	9	18
Total	34	31	65

was from contact or near contact distance ($n = 47$); in 27.7% of the cases, shooting was from intermediate range around arm reaching distance ($n = 18$).

The detailed list of entrance wound locations is given in Table 5 with regard to the type of weapon. A total of 72 entrance wounds were present in 65 gunshot suicides, and 43 of them were located in the head (59.7%), 11 of them were in the neck (15.3%), 12 of them were in the chest (16.7%) and six of them were in the abdominal (8.3%) region of the body. In general, wounds located on the outside of the head region were caused by long-barrelled weapons. Furthermore, in shootings where the entrance wounds located in the head region were involving long-barrelled weapons, most of the entrance wounds (11/13) were positioned around the face region such as eye, forehead or back of ear.

Multiple entrance wounds were present in 6.1% of cases ($n = 4$). Of these four cases, two of them had two, one of them had three and one of them had four entrance wounds. In these cases, three victims used long-barrelled weapons, and one victim used a handgun. Intriguingly, all of the victims in these cases involving long-barrelled weapons were soldiers and their weapons were military rifles set on auto-

Table 5
Location of entrance wound with regard to type of the weapon

Entrance wounds	Short-barrelled	Long-barrelled	Total
<i>Head</i>	30	13	43
Right temple	12	2	
Right temporal	6	–	
Right frontal	2	–	
Right parietal	1	–	
Right temporo-parietal	5	–	
Right fronto-parietal	2	–	
Right eye	–	5	
Right back of ear	–	1	
Forehead	2	2	
Face	–	3	
<i>Neck</i>	2	9	11
Under the chin	2	4	
Anterior-median	–	3	
Right lateral	–	2	
<i>Chest</i>	3	9	12
Presternal	2	–	
Manubrium of sternum	–	1	
Left	1	8	
<i>Abdomen</i>	–	6	6
Right	–	1	
Left	–	4	
Umbilicus	–	1	
Total	35	37	72

matic mode. In three cases, despite the usage of military weapons set on automatic mode, the entrance and exit wounds were single. It might be a result of the victims losing contact with the trigger or simply the bullets missing their target.

A more detailed description of all the suicide cases with multiple entrance wounds is given below: the first victim used a handgun and had two entrance wounds was a non-commissioned officer and both his wounds were located in the region of xiphoid process, the second victim used a military rifle and his entrance wounds were located in the left chest region; the third victim had three entrance wounds, which were located in the right side of the neck and temple regions, and finally the fourth victim had four entrance wounds and all four bullets were located in the right orbital region. In this case, although four bullets entered from the same region (right eye) and possibly at the same time, they followed different courses and were scattered inside the head like billiard balls which then exited from different regions of the head. While weapons were found at the death scene in all four cases, three victims left suicide notes.

With reference to the information obtained from the autopsy records, the course of the bullet path inside the body was reconstructed and classified into one of three categories for every plane relative to a standing position (Table 6). With regards to the wounds located in the head and neck region the direction of the bullet path coded in the frontal and horizontal planes, where the wounds were located in the chest and abdominal regions, the bullet path coded only in the sagittal plane. When gunshots were directed towards head and neck regions, the majority of the bullet pathways were upward and front-to-back (61%). In the sagittal plane, on the other hand, the course of the bullet was predominantly from right-to-left (61%).

Close examination of the records revealed that, eight of the victims did not die immediately after the shooting. However, in the remaining cases it is not known whether

Table 6
Direction of bullet path in regard to location of the entrance wound ($n = 54$, for head & neck; $n = 18$, for chest & abdomen)

Direction of bullet path in cases with entrance wounds located in	n	%
head & neck		
<i>Frontal plane</i>		
Front to back	33	61
Parallel	17	31
Back to front	4	8
<i>Horizontal plane</i>		
Upwards	35	65
Parallel	13	24
Downwards	6	11
Direction of bullet path in cases with entrance wounds located in	n	%
chest abdomen		
<i>Sagittal plane</i>		
Right to left	11	61
Parallel	4	22
Left to right	3	17

Table 7
Survival time, location of entrance and exit wounds in cases known ($n = 8$) not died after shooting

Survival time	Entrance wound	Exit wound
3 h	Right temporal	Left parietal
3 h	Right temple	Left parietal
5 h	Right abdomen	Left lumbar
7 h	Right temporal	Left temporal
2 days	Right frontal	Left parietal
3 days	Left chest	Left scapula
4 days	Right temporal	Left temporal
8 days	Right temporo-parietal	Left fronto-parietal

the victims, died immediately after the shooting or after a while particularly those who committed suicide while they were alone or in the absence of witnesses. The survival time and location of entrance and exit wounds of victims who are known not to have died immediately after the shooting is given in Table 7.

In general, 21 of the victims left suicide notes, thirty-one of the suicides were witnessed either directly or indirectly by the sound of the shooting. Three of the victims have attempted suicide previously by using another method before using the firearm (cologne drinking, pill taking or hanging). Furthermore, dyadic death was present in three of the cases: in the first case, the victim first shot his wife with a handgun; in the second case, the victim first shot his wife and two kids with a handgun, and in the third case, the victim who was a soldier shot himself after shooting two other soldiers with a military rifle.

4. Discussion

In this study, a total of 318 suicide cases recorded in Eskisehir were investigated from 1991 to 2000. During this ten-year period, the crude suicide rate in Turkey was varying from 2.00 to 3.11/100,000.^{24,25} At the same time, the mean population of Eskisehir was 687,000 and the crude suicide rate in Eskisehir was calculated as 4.63/100,000 per year, on average. Although the rate in Eskisehir was significantly higher than the rate in Turkey, in general the incidence of suicide cases in both Eskisehir and Turkey were lower than many other countries in Europe, Asia and America.^{8,9} Among the suicide cases investigated in Eskisehir, gunshot wounds was the second most frequent mode of death (20.4%), followed by hanging and the percentage was found similar to those reported for Turkey between 1991 and 2000 (19.8%). In contrast, firearm-related suicides were the most common mode of suicide in the United States with a percentage of 60.9, between 1990 and 1995 years.⁹ When compared with other geographical regions, firearm usage makes up 45.4% of the suicides in Argentina, and 31.5% in Mexico. Whereas, the rates were significantly lower in Asian countries such as, South Korea and Japan (0.2%), Hong Kong (0.7%), Singapore (1.2%) and Taiwan (1.7%). Relatively moderate amount of deaths have been reported from many European countries like Finland (21.2%), France (24.7%), Germany

(10.4%), Austria (18.3%), Greece (24.7%) and Norway (28.9%).⁹

In accordance with the evidence,^{2,3,5,7,8,13,16,26,27} the majority of suicide victims in Eskisehir were male and the gunshot usage rate was more common in males at younger ages. Female victims consisted of 9.2% of the gunshot suicides and this proportion was higher than studies reported in German-speaking countries (5–7%) and Scandinavia (1–3%), but still lower than those reported in the United States (20–30%).¹³

In our study, the usage rate of long-barrelled weapons in gunshot suicides was 48%. While approximately one third of the weapons used were shotguns, the remaining part comprised of military weapons. In general, the long-barrelled weapon usage rate was higher than those reported in many other studies.^{13,14,16,28} The presence of a “Military Air Base” might be responsible for the higher rate of military personnel originated suicides in Eskisehir. The preference between short or long-barrelled firearms in both suicides and homicides also varies between different countries according to historical reasons, cultural background or legal regulations of the countries. For instance, studies in German-speaking countries and North America, short-barrelled weapons prevailed; whereas studies in Scandinavia, Great Britain and Australia, long-barrelled weapons, especially shotguns, were used predominantly.¹³ In Iran, on the other hand, almost all of the long-barrelled weapons used by suicide victims were military rifles.¹ Again, these variations could be related to the strict gun control regulations of this country.

Another important issue deserving to be highlighted in our study is that the percentage of licensed weapon usage was significantly higher among the victims (69.2%), and noticeably, 75.5% of them possessed these weapons because of their occupations. Therefore, access to weapons plays an important role in the prevalence of the gunshot suicides. International studies also provide evidence of a strong association between the rate of gun ownership and gunshot suicides.^{1,2,26,28–32} It was reported that, in the Stockholm area, from the period of 1980–1981 to 1990–1991, illegal gun usage increased from 20% to 30%, respectively; and in parallel to this rise, gunshot suicide rates increased by 18%.¹⁸ On the other hand, a decrease in gunshot suicide rates following the introduction of restrictive firearm legislation also reported in different countries. In the United Kingdom, over the past 20 years, the number of gunshot suicides declined by over 50% per year.²⁶ At the same time, firearm legislation has become progressively more restrictive and the rate of gun ownership has declined. Thus, the access to firearms can significantly affect the amount of firearm-related crimes. In the United States, 62% of youth suicides (between 14 and 20 years) occurred by the usage of firearms for the period of 1976–2001. In order to reduce this high rate, many state and federal laws included age-specific restrictions on the purchase, possession, and storage of firearms. However, these restrictions and child access prevention laws resulted in a moder-

ate reduction in suicide rates among youth, aged 14–17 years, but they did not appear to reduce the overall rates of suicide among the youth population.³³ From a different point of view, in Croatia, the usage of firearms as a method of suicide was higher (18.8%) during the war period (1991–1995) than those of pre- or post-war periods, 6.9% and 14.3 %, respectively.³⁴

Suicides are commonly caused by single shots, but 6.1% of gunshot suicides in our study, and 1–8% in other studies,^{5,13,17,35–37} had multiple entrance wounds. The multiple numbers of entrance wounds in suicides might be due to one of the following possibilities: the first possibility may occur when an automatic weapon is set on full automatic mode. For example, in Tehran, the frequency of multiple entrance wounds was very high (18.5%) among suicidal shootings, and all of them (5/27) were caused by the usage of military weapons set on automatic mode.¹ In our cases, too, military rifles set on automatic mode caused three out of four suicidal shootings with multiple entrance wounds. In addition, examination of the entrance wounds revealed that a single entry zone might be present with a typical shapes in cases using automatic weapons. As a matter of fact, in one of our cases, all four of the bullets entered from the right orbital region and exited from four different locations. Tributsch et al.²³ also pointed out unusual star-shaped wound morphology via the double-shots caused by the pressure of the exploded gas left in the barrel after the first shot. Among the 117 suicide cases reported by Betz et al.,⁵ seven of them had multiple wounds, and in two of these suicides, the second shot was placed directly in the wound made by the first shot.

The discharging of the guns more than once against the head or body regions might be another cause of the multiple entrance wounds. Although a maximum of two shots have been reported to the head,^{22,37,38} as many as nine³⁹ and fourteen⁴⁰ gunshots have been described for the chest region. Only one of our cases had two entrance wounds in his chest region caused by two shots with a handgun. An exceptional suicide case with multiple wounds located in right temple, presternal and lower thoracic back regions were also reported by Hirsch and Adelson.²⁰ In addition to the above possibilities, the simultaneous usage of two firearms or the usage of special set up with a combination of the weapons have been reported.^{6,37}

In parallel to the previous series,^{13,14,16} our study demonstrated that the shooting distance was contact or near-contact in a majority of the cases (72.3%), but shootings from arm reaching distance were also present in 27.7% of the cases, in which deposition of soot, powder or back spatter traces were seen. When the site of the entrance wounds is located outside the head region, long-barrelled firearms were usually responsible for the shootings. Generally, in shootings with long-barrelled weapons, the individual intending suicide is in a sitting position by leaning over the weapon and holding the butt of the weapon against the ground while directing the barrel towards the face, chest or abdomen. The trigger can be pulled either by finger

or toe; such cases were present in our study as well. Occasionally, some individuals constructed devices to shoot themselves from a distance.

Like in the other series of suicides,^{5,10,11,13,16–19} localization of the entrance wound to the head region was a common finding in our study. Although we already established the “classical” entrance locations for suicides like: the temple, the mouth, the forehead and the chest region; extraordinary sites such as the back of the head, the cheek, the eye, the nose, the parietal region, the back and the intra-rectal region have also been reported in previous studies.^{5,13,20,41}

The direction of the bullet path might be an important indicator in distinguishing between homicides and suicides. In accordance with the reports of Druid⁴² and Karger et al.,¹³ in gunshots towards head and neck, the bullet path directed upward and front-to-back; whereas in gunshots towards abdomen, it was directed from right-to-left.

Finally, some of our cases also showed special features: in three cases, victims attempted different methods of suicide before attempting a gunshot suicide. Likewise, Pad-osch et al.⁴³ has reported a case of unusual suicide with poisoning and shooting himself twice in the head with self-inflicted gunshot. In six of the cases, despite the intracranial trajectories of bullets from right fronto-temporal region to left temporal and parietal regions, the victims survived for a while after the attempt. This could be due to the limited tissue damage that missed targets of immediate incapacitation.³⁷ The survival rate of victims, especially in those having cranio-facial injuries, can be critically altered by an accurate initial evaluation and determination of the entrance and exit wounds.^{4,29,44} Between 1994 and 1999 years, in a series of nine patients with the diagnosis of serious gunshot wounds to the head, Harat et al.,²⁹ was able to rescue and improve the health condition of seven victims with intensive care. Therefore, treatment of life-threatening firearm injuries requires intensive pre and post operative care which can improve the outcome of victims.

References

1. Amiri A, Sanaei-Zadeh H, Towfighi ZH, et al. Firearm fatalities. A preliminary study report from Iran. *J Clin Forensic Med* 2003;**10**:159–63.
2. Kaplan MS, Geling O. Sociodemographic and geographic patterns of firearm suicide in the United States, 1989–1993. *Health Place* 1999;**5**:179–85.
3. Lecomte D, Fornes P. Suicide among youth and young adults, 15 through 24 years of age. A report of 392 cases from Paris, 1989–1996. *Forensic Sci* 1998;**43**:964–8.
4. Cummings P, LeMier M, Keck DB. Trends in firearm-related injuries in Washington State, 1989–1995. *Ann Emerg Med* 1998;**32**:77–9.
5. Betz P, Peschel O, Eisenmenger W. Suicidal gunshot wounds-site and characteristics. *Arch Kriminol* 1994;**193**:65–71.
6. Di Maio VJM. *Gunshot wounds*. 2nd ed. New York: CRC press; 1999. p. 355–76.
7. Meel BL. Determinants of suicide in the Transkei sub-region of South Africa. *J Clin Forensic Med* 2003;**10**:71–6.
8. Centers for Disease Control and Prevention. Methods of suicide among persons aged 10–19 years United States, 1992–2001. *Morb Mortal Wkly Rep* 2004;**53**:471–4.

9. Krug EG, Powell KE, Dahlberg LL. Firearm-related deaths in the United States and 35 other high and upper-middle-income countries. *Int J Epidemiology* 1998;**27**:214–21.
10. Perdekamp MG, Braunwarth R, Schmidt W, et al. Contact shot from infantry weapons with a flash-suppressor. *Arch Kriminol* 2003;**212**:10–8.
11. Stone IC. Observations and statistics relating to suicide weapons. *J Forensic Sci* 1987;**32**:711–6.
12. Garavaglia JC, Talkington B. Weapon location following suicidal gunshot wounds. *Am J Forensic Med Pathol* 1999;**20**:1–5.
13. Karger B, Billeb E, Koops E, et al. Autopsy features relevant for discrimination between suicidal and homicidal gunshot injuries. *Int J Legal Med* 2002;**116**:273–8.
14. Stone IC. Characteristics of firearms and gunshot wounds as markers of suicide. *Am J Forensic Med Pathol* 1992;**13**:275–80.
15. Knigh B. *Forensic pathology*. London: Hodder & Stoughton; 1991. p. 216.
16. Avis SP. Suicidal gunshot wounds. *Forensic Sci Int* 1994;**67**:41–7.
17. Eisele JW, Reay DT, Cook A. Sites of suicidal gunshot wounds. *J Forensic Sci* 1981;**21**:659–66.
18. Karlsson T, Isaksson B, Ormstad K. Gunshot fatalities in Stockholm, Sweden with special reference to the use of illegal weapons. *J Forensic Sci* 1993;**38**:1409–21.
19. Janssen W, Miyaishi S, Koops E, et al. Gunshot fatalities in connection with hunting and hunting rifles – causes, prevention and expert evaluation. *Arch Kriminol* 1996;**197**:1–15.
20. Hirsch CS, Adelson L. A suicidal gunshot wound of the back. *J Forensic Sci* 1976;**26**:480–5.
21. Yaralar Cetin G. In: Soysal Z, Cakalir C, editors. *Adli Tip*. Istanbul: Istanbul Universitesi; 1999. p. 519–20.
22. Grellner W, Buhmann D, Wilske J. Suicide by double bolt gunshot wound to the head: case report and review of the literature. *Arch Kriminol* 2000;**205**:162–8.
23. Tributsch W, Rabl W, Ambach E. Unusual wound morphology after textile penetration by the automatic rifle (StG) 58. A case report. *Arch Kriminol* 1991;**187**:75–83.
24. State Institute of Statistics Prime Ministry Republic of Turkey. Suicide statistics; 1994.
25. State Institute of Statistics Prime Ministry Republic of Turkey. Suicide statistics; 2002.
26. Haw C, Sutton L, Simkin S, et al. Suicide by gunshot in the United Kingdom a review of literature. *Med Sci Law* 2004;**44**:295–310.
27. Goren S, Subasi M, Tirasci Y, et al. Firearm-related mortality: a review of four hundred-forty four. *Tohoku J Exp Med* 2003;**201**:139–45.
28. Grassel KM, Wintemute GJ, Wright MA, et al. Association between handgun purchase and mortality from firearm injury. *Inj Prev* 2003;**9**:48–52.
29. Harat M, Szolna A, Bialozyk P. Facial-cerebral gunshot wounds. *Neurol Neurochir Pol* 2000;**34**:487–500.
30. Ludwig J, Cook PJ. Homicide and suicide rates associated with implementation of the Brady handgun violence prevention act. *JAMA* 2000;**284**:616–8.
31. Miller M, Hemenway D, Azrael D. Firearms and suicide in the northeast. *J Trauma* 2004;**57**:626–32.
32. Clarke PV, Jones PR. Suicide and increased availability of handguns in the United States. *Soc Sci Med* 1989;**28**:805–9.
33. Webster DW, Vernick JS, Zeoli AM, et al. Association between youth-focused firearm laws and youth suicides. *JAMA* 2004;**292**:594–601.
34. Bosnar A, Stemberga V, Cuculic D, et al. Suicide rate after the 1991–1995 War in Southwestern Croatia. *Arch Med Res* 2004;**35**:344–7.
35. Desinan L, Mazzolo GM. Gunshot fatalities: suicide, homicide or accident? A series of 48 cases. *Forensic Sci Int* 2005;**147** suppl: 37–40.
36. Hudson P. Multishot firearm suicide. Examination of 58 cases. *Am J Forensic Med Pathol* 1981;**2**:239–42.
37. Karger B, Brinkmann B. Multiple gunshot suicides: potential for physical activity and medico-legal aspects. *Int J Legal Med* 1997;**110**:188–92.
38. Karger B. Penetrating gunshots to the head and lack of immediate incapacitation. II. Review of case reports. *Int J Legal Med* 1995;**110**:117–26.
39. Habbe D, Thomas GE, Gould J. Nine-gunshot suicide. *Am J Forensic Med Pathol* 1989;**10**:335–7.
40. Boxho P. Fourteen shots for a suicide. *Forensic Sci Int* 1999;**101**:71–7.
41. Prahlow JA. Suicide by intrarectal gunshot wound. *Am J Forensic Med Pathol* 1998;**19**:356–61.
42. Druid H. Site of entrance wound and direction of bullet path in firearm fatalities as indicators of homicide versus suicide. *Forensic Sci Int* 1997;**88**:147–62.
43. Padosch SA, Schmidt PH, Madea B. Planned complex suicide by self-poisoning and a manipulated blank revolver: remarkable findings due to multiple gunshot wounds and self-made wooden projectiles. *J Forensic Sci* 2003;**48**:1371–8.
44. Reiss M, Reiss G, Pilling E. Gunshot injuries in the head–neck area–basic principles, diagnosis and management. *Schweiz Rundsch Med Prax* 1998;**87**:832–8.